



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Inter Patent Application of

THOMSEN et al.

Serial No. 10/622,834

Filed: July 21, 2003

For: GREY GLASS COMPOSITION

Atty. Ref.: 3691-573

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Examiner: Bolden, Elizabeth A.

\*\*\*\*\*

May 9, 2006

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**

Sir:

Applicant hereby appeals to the Board of Patent Appeals and Interferences from  
the last decision of the Examiner.

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01 FC:1402 500.00 OP

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**(I) REAL PARTY IN INTEREST**

The real party in interest is Guardian Industries Corp., a corporation of the country of the United States of America.

**(II) RELATED APPEALS AND INTERFERENCES**

The appellant, the undersigned, and the assignee are not aware of any related appeals, interferences, or judicial proceedings (past or present), which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

**(III) STATUS OF CLAIMS**

Claims 1-31 are pending and have been rejected. No claims have been substantively allowed.

**(IV) STATUS OF AMENDMENTS**

No amendments have been filed since the date of the Final Rejection.

**(V) SUMMARY OF EXAMPLE SUBJECT MATTER**

For purposes of example and without limitation, certain example embodiments of this invention relate to a grey glass composition. The grey glass composition is soda-lime-silica based in certain example embodiments of this invention, and thus includes from 67-75% SiO<sub>2</sub>, from 10-20% Na<sub>2</sub>O, and from 5-15% CaO. The soda-lime-silica glass may be made via the float process in certain example embodiments of this invention. Glasses according to this invention may be used in any suitable application, including as glass for use in vehicle windows and/or architectural windows.

It is desirable to minimize the transmission of infrared (IR) radiation and ultraviolet (UV) radiation through glass in many instances. For instance, UV radiation has the ability to damage furniture in rooms, and cause sunburn to persons in vehicles or buildings. Moreover, IR radiations tends to quickly heat up the interior of buildings and/or vehicles if large quantities of the same are permitted to pass through the glass of the buildings and/or vehicles. Thus, low IR and UV transmissions are often desirable. In certain example embodiments of this invention, the grey glass has an IR transmittance (%IR) of no greater than 35%, a UV transmittance (%UV) of no greater than 40%, and a total solar transmittance (%TS) of no greater than 52%. These low values are advantageous in a single glass product in that they can simultaneously provided for reduced heating up of building/vehicle interiors and less damage to furniture and/or persons in buildings and/or vehicles.

In certain example embodiments of this invention, the combination of low %IR, low%UV and low %TS may be achieved through a unique combination of elements making up the glass composition. In certain example embodiments of this invention, the

colorant portion of the glass includes a unique mixture of components including certain amounts of iron, selenium, cobalt, cerium, titanium oxide and reducing agent(s) such as Si and/or C are provided in the glass batch so as to achieve a high glass redox value, as well as a desired combination in the final glass product of (a) IR transmittance (%IR) of no greater than 35% (more preferably no greater than 30% or even 29%), (b) UV transmittance (%UV) of no greater than 40%, and (c) total solar transmittance (%TS) of no greater than 52% (more preferably no greater than 50% or even 49%).

In certain example embodiments of this invention, the glass may include from 0.01 to 1.0% cerium oxide, more preferably from about 0.05 to 0.75% cerium oxide. As explained in paragraph [0022] for example, cerium oxide is important in that it functions as an oxidizing agent and helps reduce UV transmission.

**(VI) GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

1. Whether claims 1-8, 10-20 and 22-31 are unpatentable under 35 U.S.C. Section 103(a) over Boulos (US 2004/0102304).

2. Whether claims 1-31 are unpatentable under 35 U.S.C. Section 103(a) over Arbab. The final rejection on page 3 states that Arbab is “2004/0102304.” However, this is clearly not correct, because this number is the publication number of Boulos – there is a clear typographical error in the final rejection in this regard. Thus, applicant has assumed that the Examiner was referring to Arbab 2003/0216242 in the final rejection. If this is not the Arbab reference being referred to in the final rejection, then prosecution should be reopened and the reference should be correctly identified.

(VII) ARGUMENT

It is axiomatic that in order for a reference to anticipate a claim, it must disclose, teach or suggest each and every feature recited in the claim. See, e.g., Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 218 USPQ 781 (Fed. Cir. 1983). The USPTO has the burden in this respect.

The law is clear that a claimed feature is “inherent” in a reference only if that feature is “necessarily” present in the reference, “not merely probably or possibly present.” *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002). Furthermore, when the claimed invention is not identically disclosed in a reference, and instead requires picking and choosing among a number of different options or embodiments disclosed by the reference, then the reference does not anticipate. See *Akzo N.V. v. United States Int’l Trade Commission*, 808 F.2d 1471, 1480 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987); *In re Arkley*, 455 F.2d 586, 587-88 (CCPA 1972). Thus, the PTO cannot randomly pick and choose different features from different embodiments of a reference in an attempt to meet the invention of a claim.

Moreover, the USPTO has the burden under 35 U.S.C. Section 103 of establishing a *prima facie* case of obviousness. *In re Piasecki*, 745, F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). It can satisfy this burden only by showing that some objective teaching in the prior art, or that knowledge generally available to one of ordinary skill in the art, would have led that individual to combine the relevant teachings of the references to arrive at the claimed invention. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Before the USPTO may combine the disclosures of the references in order to establish a *prima facie* case of obviousness, there must be

some suggestion for doing so. In re Jones, 958 F.2d 347 (Fed. Cir. 1992). Even assuming, *arguendo*, that a given combination of references is proper, the combination of references must in any event disclose the features of the claimed invention in order to render it obvious.

Claim 1 – Boulos Rejection

Claim 1 stands rejected under 35 U.S.C. Section 103(a) as being allegedly unpatentable over Boulos (US 2004/0102304). This Section 103(a) rejection lacks merit and should be reversed for at least the following reasons.

Claim 1 requires a difficult-to-achieve *combination* of a grey glass having *each of* (a) an IR transmittance (%IR) of no greater than 35%, (b) a UV transmittance (%UV) of no greater than 40%, and (c) total solar transmittance (%TS) of no greater than 52%. It is desirable to reduce both IR and UV transmittance, and %TS, to protect occupants/interiors of vehicles and/or buildings from harmful UV rays and from the undesirable heat generated by IR radiation. This combination of low IR%, low UV% and low %TS has heretofore been difficult to achieve.

*Boulos cannot* and does not achieve in a glass product this claimed *combination* of (a) IR transmittance (%IR) of no greater than 35%, (b) UV transmittance (%UV) of no greater than 40%, and (c) total solar transmittance (%TS) of no greater than 52%. In particular, Boulos cannot achieve in a single glass the combination of (a) through (c). Even though Boulos seeks good UV and IR properties, Boulos was not even able to figure out how to achieve a grey glass which realizes both (a) and (b), thereby evidencing the inventiveness of the invention of claim 1. Examples 1-84 of Boulos make clear that Boulos, despite trying to achieve low IR and low UV, was unable to achieve a glass

which combined (a) and (b) as required by claim 1 (let alone (a), (b) and (c) as required by claim 1).

For instance, Example 1 of Boulos set forth on page 3 in Table III has a good %IR of 26.25, but an undesirably high %UV of 41.17%. Thus, Boulos was able to realize a %IR in the claimed range in Example 1, but was not able to couple it with a %UV within the claimed range of no greater than 40%. Examples 2-15, 17-21, 24-30, and 32-84 of Boulos are similarly flawed in that the %UV is too high and is outside of the claimed %UV range. Whenever Boulos was able to achieve a %UV of no greater than 40% as called for in claim 1, both the %IR and %TS undesirably shot up outside of the claimed range (e.g., see Examples 16, 22, 23 and 31 of Boulos). Boulos was clearly not able to achieve a glass capable of realizing the combination of (a) %IR of no greater than 35%, (b) %UV of no greater than 40%, and (c) %TS of no greater than 52%, as required by claim 1. Boulos could not even achieve the combination of (a) and (b), let alone (a) through (c). Nothing in Boulos suggests that Boulos was able to achieve a glass capable of realizing both (a), (b) and (c) in combination. Paragraph [0019] of Boulos is merely summarizing the Examples and taking into account the ranges thereof, and does not state or suggest that a combination of (a), (b) and (c) was achieved in a single glass.

Thus, it will be appreciated that claim 1 defines over Boulos for at least the above reasons. In particular, Boulos was clearly not able to achieve a glass capable of realizing the combination of (a) through (c) in a single glass product as required by claim 1. Moreover, there is nothing in Boulos which discloses or suggests this claimed combination, or which suggest how one could modify the glasses of Boulos to achieve such a combination. Furthermore, the fact that Boulos was unable to achieve this claimed

combination (even though Boulos sought good IR and UV properties) evidences the unexpected/surprising results and inventiveness of the invention of claim 1.

To the extent that the Examiner is trying to use a %UV from one example of Boulos and a %IR (or %TS) from another different example glass of Boulos in order to meet claim 1, this is not permissible. When the claimed invention is not identically disclosed in a reference, and instead requires picking and choosing among a number of different options or embodiments disclosed by the reference, then the reference does not anticipate. See *Akzo N.V. v. United States Int'l Trade Commission*, 808 F.2d 1471, 1480 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987); *In re Arkley*, 455 F.2d 586, 587-88 (CCPA 1972). Thus, the Examiner cannot randomly pick and choose different features from different embodiments of a reference in an attempt to meet the invention of a claim. Furthermore, the final rejection does not even contend that it would have been obvious to have modified an embodiment of Boulos based on another embodiment of Boulos. There is nothing in Boulos which suggests how to modify Boulos' glasses in order to meet the invention of claim 1.

*Claim 1 - Arbab Rejection*

Claim 1 stands rejected under 35 U.S.C. Section 103(a) as being allegedly unpatentable over Arbab (*presumably* 2003/0216242). The final rejection on page 3 states that Arbab is "2004/0102304." However, this is clearly not correct, because this number is the publication number of Boulos – there is a clear typographical error in the final rejection. Thus, applicant has assumed that the Examiner was referring to Arbab 2003/0216242 in the final rejection. This Section 103(a) rejection lacks merit and should be reversed for at least the following reasons.

First, claim 1 requires very specific parameters including from *0.01 to 1.0 % cerium oxide*. For purposes of example and without limitation, the instant specification explains that cerium oxide is used in order to reduce %UV by causing FeO in the batch to oxidize. E.g., see paragraphs [0022] and [0023] of the instant specification.

Arbab fails to disclose or suggest this feature of claim 1. There is nothing in Arbab which discloses or suggests 0.01 to 1.0% cerium oxide. Moreover, there is no suggestion or motivation in the art of record which would have led one of ordinary skill to have modified Arbab to meet this requirement of claim 1. Still further, applicant again notes that one cannot randomly pick and choose different features from different embodiments of a reference in an attempt to meet the invention of a particular claim. *See Akzo N.V. v. United States Int'l Trade Commission*, 808 F.2d 1471, 1480 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987); *In re Arkley*, 455 F.2d 586, 587-88 (CCPA 1972).

This claimed 0.01 to 1.0% amount of cerium oxide is important so as to allow the UV and IR characteristics to be maintained, and this amount of cerium oxide is not disclosed or suggested by Arbab. There are no overlapping ranges in Arbab in this respect. It is also noted that cerium oxide does not naturally occur in the elements used to make glass (thus, it cannot be inherently present in the glass). Hindsight is not permissible.

Second, the UV values (see Auto UV in Table 2) of Arbab's samples are not within the claimed range of no greater than 40% as required by claim 1. None of Arbab's samples meet this requirement of claim 1. There are no overlapping ranges in Arbab in

this respect. Thus, Arbab also fails to disclose or suggest a %UV of no greater than 40% as required by claim 1.

Arbab fails to disclose or suggest the invention of claim 1 for each of the aforesaid reasons.

Claim 2

Claim 2 requires %IR of no greater than 30%. Boulos fails to disclose or suggest this in combination with a %UV of no greater than 40%. For example, many examples in Boulos have a %IR above this range and thus outside the scope of claim 2, while the remaining examples of Boulos do not meet the %UV requirement of claim 2/1. Arbab is similarly flawed.

Claim 6

Claim 6 requires %TS of no greater than 50%. Boulos fails to disclose or suggest this feature, in combination with the %UV and %IR requirements of claim 6. Many examples in Boulos have a %TS outside of the range required by claim 6. Moreover, the examples in Boulos that have a %TS within the range of claim 6 (e.g., see Exs. 1-2 of Boulos) have %UV that is too high and thus well outside of the claimed % UV range of claim 6. Thus, it will be appreciated that Boulos cannot achieve a combination of %TS no greater than 50% and %UV of no greater than 40%. Boulos teaches away from the invention of claim 6 in this respect.

Arbab is similarly flawed in that Arbab cannot achieve a combination of %TS no greater than 50% and %UV of no greater than 40%. For instance, Samples 1-6 of Arbab have %TS above 50% and thus outside of the claimed range in this regard; whereas

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Samples 7-12 have a %TS within the claimed range but cannot simultaneously achieve a %UV of no greater than 40% as required by this claim.

Claim 7

Claim 7 requires 0.05 to 0.75% cerium oxide. Arbab fails to disclose or suggest this feature of claim 7.

Claim 9

Claim 9 requires 0.10 to 0.60% cerium oxide and 0.05 to 0.6% titanium oxide. Both Arbab and Boulos fail to disclose or suggest this feature of claim 9.

Claim 10

Claim 10 requires %IR of no greater than 29%. Boulos fails to disclose or suggest this in combination with a %UV of no greater than 40%. For example, many examples in Boulos have a %IR above this range and thus outside the scope of claim 10, while the remaining examples of Boulos do not meet the %UV requirement of claim 10/1. Arbab is similarly flawed.

Claim 12

Claim 12 requires the following color features: a\* from -4 to +1; b\* from -3 to +3; and L\* from 80 to 95. Boulos fails to disclose or suggest these color characteristics of the glass of claim 12.

Claim 13

Claim 13 defines over Boulos and Arbab for the reasons discussed above with respect to claim 1.

Claim 14

Claim 14 requires %IR of no greater than 30%. Boulos fails to disclose or suggest this in combination with a %UV of no greater than 40%. For example, many examples in Boulos have a %IR above this range and thus outside the scope of claim 14, while the remaining examples of Boulos do not meet the %UV requirement of claim 14/13. Arbab is similarly flawed.

Claim 18

Claim 18 requires %TS of no greater than 50%. Boulos fails to disclose or suggest this feature, in combination with the %UV and %IR requirements of claim 18. Many examples in Boulos have a %TS outside of the range required by claim 18. Moreover, the examples in Boulos that have a %TS within the range of claim 18 (e.g., see Exs. 1-2 of Boulos) have %UV that is too high and thus well outside of the claimed % UV range of claim 18. Thus, it will be appreciated that Boulos cannot achieve a combination of %TS no greater than 50% and %UV of no greater than 40%. Boulos teaches away from the invention of claim 18 in this respect.

Arbab is similarly flawed in that Arbab cannot achieve a combination of %TS no greater than 50% and %UV of no greater than 40%. For instance, Samples 1-6 of Arbab have %TS above 50% and thus outside of the claimed range in this regard; whereas Samples 7-12 have a %TS within the claimed range but cannot simultaneously achieve a %UV of no greater than 40% as required by this claim.

Claim 19

Claim 19 requires 0.05 to 0.75% cerium oxide. Arbab fails to disclose or suggest this feature of claim 19.

Claim 21

Claim 21 requires 0.10 to 0.60% cerium oxide and 0.05 to 0.6% titanium oxide. Both Arbab and Boulos fail to disclose or suggest this feature of claim 21.

Claim 22

Claim 22 requires %IR of no greater than 29%. Boulos fails to disclose or suggest this in combination with a %UV of no greater than 40%. For example, many examples in Boulos have a %IR above this range and thus outside the scope of claim 22, while the remaining examples of Boulos do not meet the %UV requirement of claim 22/13. Arbab is similarly flawed.

Claim 24

Claim 24 requires the following color features: a\* from -4 to +1; b\* from -3 to +3; and L\* from 80 to 95. Boulos fails to disclose or suggest these color characteristics of the glass of claim 24.

Claim 25 – Boulos Rejection

Claim 25 stands rejected under 35 U.S.C. Section 103(a) as being allegedly unpatentable over Boulos (US 2004/0102304). This Section 103(a) rejection lacks merit and should be reversed for at least the following reasons.

Claim 25 requires a difficult-to-achieve *combination* of a grey glass having *each of* (a) an IR transmittance (%IR) of no greater than 35%, and (b) a UV transmittance (%UV) of no greater than 40%. It is desirable to reduce both IR and UV transmittance, in order to protect occupants/interiors of vehicles and/or buildings from harmful UV rays and from the undesirable heat generated by IR radiation. This combination of low IR%, low UV% has heretofore been difficult to achieve.

*Boulos cannot* and does not achieve in a glass product this claimed *combination* of (a) IR transmittance (%IR) of no greater than 35%, and (b) UV transmittance (%UV) of no greater than 40%. In particular, Boulos cannot achieve in a single glass the combination of (a) and (b). Even though Boulos seeks good UV and IR properties, Boulos was not even able to figure out how to achieve a grey glass which realizes both (a) and (b), thereby evidencing the inventiveness of the invention of claim 25. Examples 1-84 of Boulos make clear that Boulos, despite trying to achieve low IR and low UV, was unable to achieve a glass which combined (a) and (b) as required by claim 25.

For instance, Example 1 of Boulos set forth on page 3 in Table III has a good %IR of 26.25, but an undesirably high %UV of 41.17%. Thus, Boulos was able to realize a %IR in the claimed range in Example 25, but was not able to couple it with a %UV within the claimed range of no greater than 40%. Examples 2-15, 17-21, 24-30, and 32-84 of Boulos are similarly flawed in that the %UV is too high and is outside of the claimed %UV range. Whenever Boulos was able to achieve a %UV of no greater than 40% as called for in claim 25, the %IR undesirably shot up outside of the claimed range (e.g., see Examples 16, 22, 23 and 31 of Boulos). Boulos was clearly not able to achieve a glass capable of realizing the combination of (a) %IR of no greater than 35%, and (b) %UV of no greater than 40% as required by claim 25.

Thus, it will be appreciated that claim 25 defines over Boulos for at least the above reasons. In particular, Boulos was clearly not able to achieve a glass capable of realizing the combination of (a) and (b) in a single glass product as required by claim 25. Moreover, there is nothing in Boulos which discloses or suggests this claimed combination, or which suggests how one could modify the glasses of Boulos to achieve

such a combination. Furthermore, the fact that Boulos was unable to achieve this claimed combination (even though Boulos sought good IR and UV properties) evidences the unexpected/surprising results and inventiveness of the invention of claim 25.

To the extent that the Examiner is trying to use a %UV from one example of Boulos and a %IR (or %TS) from another different example glass of Boulos in order to meet claim 25, this is not permissible. When the claimed invention is not identically disclosed in a reference, and instead requires picking and choosing among a number of different options or embodiments disclosed by the reference, then the reference does not anticipate. See *Akzo N.V. v. United States Int'l Trade Commission*, 808 F.2d 1471, 1480 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987); *In re Arkley*, 455 F.2d 586, 587-88 (CCPA 1972). Thus, the Examiner cannot randomly pick and choose different features from different embodiments of a reference in an attempt to meet the invention of a claim. Furthermore, the final rejection does not even contend that it would have been obvious to have modified an embodiment of Boulos based on another embodiment of Boulos. There is nothing in Boulos which suggests how to modify Boulos' glasses in order to meet the invention of claim 25.

*Claim 25 - Arbab Rejection*

Claim 25 also stands rejected under 35 U.S.C. Section 103(a) as being allegedly unpatentable over Arbab (*presumably* 2003/0216242). This Section 103(a) rejection lacks merit and should be reversed for at least the following reasons.

First, claim 25 requires very specific parameters including from 0.01 to 1.0 % cerium oxide. For purposes of example and without limitation, the instant specification explains that cerium oxide is used in order to reduce %UV by causing FeO in the batch to

oxidize. E.g., see paragraphs [0022] and [0023] of the instant specification. Arbab fails to disclose or suggest this feature of claim 25. There is nothing in Arbab which discloses or suggests 0.01 to 1.0% cerium oxide. Moreover, there is no suggestion or motivation in the art of record which would have led one of ordinary skill to have modified Arbab to meet this requirement of claim 25. Still further, applicant again notes that one cannot randomly pick and choose different features from different embodiments of a reference in an attempt to meet the invention of a particular claim. *See Akzo N.V. v. United States Int'l Trade Commission*, 808 F.2d 1471, 1480 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987); *In re Arkley*, 455 F.2d 586, 587-88 (CCPA 1972).

This claimed 0.01 to 1.0% amount of cerium oxide is important so as to allow the UV and IR characteristics to be maintained, and this amount of cerium oxide is not disclosed or suggested by Arbab. There are no overlapping ranges in Arbab in this respect. It is also noted that cerium oxide does not naturally occur in the elements used to make glass (thus, it cannot be inherently present in the glass). Hindsight is not permissible.

Second, the UV values (see Auto UV in Table 2) of Arbab's samples are not within the claimed range of no greater than 40% as required by claim 25. None of Arbab's samples meet this requirement of claim 25. There are no overlapping ranges in Arbab in this respect. Thus, Arbab also fails to disclose or suggest a %UV of no greater than 40% as required by claim 25.

Arbab fails to disclose or suggest the invention of claim 25 for each of the aforesaid reasons.

Claim 29

Claim 29 requires %TS of no greater than 50%. Boulos fails to disclose or suggest this feature, in combination with the %UV and %IR requirements of claim 25. Many examples in Boulos have a %TS outside of the range required by claim 29. Moreover, the examples in Boulos that have a %TS within the range of claim 29 (e.g., see Exs. 1-2 of Boulos) have %UV that is too high and thus well outside of the claimed %UV range of claim 29/25. Thus, it will be appreciated that Boulos cannot achieve a combination of %TS no greater than 50% and %UV of no greater than 40%. Boulos teaches away from the invention of claim 29 in this respect.

Arbab is similarly flawed in that Arbab cannot achieve a combination of %TS no greater than 50% and %UV of no greater than 40%. For instance, Samples 1-6 of Arbab have %TS above 50% and thus outside of the claimed range in this regard; whereas Samples 7-12 have a %TS within the claimed range but cannot simultaneously achieve a %UV of no greater than 40% as required by this claim.

Claim 30

Claim 30 requires 0.05 to 0.75% cerium oxide. Arbab fails to disclose or suggest this feature of claim 30.

**CONCLUSION**

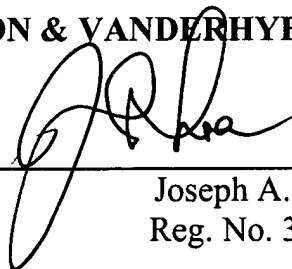
In conclusion it is believed that the application is in clear condition for allowance; therefore, early reversal of the Final Rejection and passage of the subject application to issue are earnestly solicited.

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Respectfully submitted,

**NIXON & VANDERHYE P.C.**

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(VIII) CLAIMS APPENDIX

1. A grey glass comprising:

a base glass portion comprising:

| Ingredient                     | wt. %     |
|--------------------------------|-----------|
| SiO <sub>2</sub>               | 67 – 75 % |
| Na <sub>2</sub> O              | 10 – 20 % |
| CaO                            | 5 – 15 %  |
| MgO                            | 0 – 7 %   |
| Al <sub>2</sub> O <sub>3</sub> | 0 – 7 %   |
| K <sub>2</sub> O               | 0 – 7 %   |

and a colorant portion consisting essentially of:

|   |                  |
|---|------------------|
| total iron (expressed as Fe <sub>2</sub> O <sub>3</sub> ) | 0.25 to 0.70 %   |
| cerium oxide  | 0.01 to 1.0 %    |
| selenium  | 0.00001 to 0.05% |
| cobalt oxide  | 0.0001 to 0.05%  |
| titanium oxide  | 0 to 1.0%        |

wherein the grey glass has a redox value (FeO/Fe<sub>2</sub>O<sub>3</sub>) of at least 0.30, a visible transmittance (Lta) of at least 65%, a dominant wavelength in the range of from 435 nm to 570 nm, an excitation purity (Pe) of no greater than 5.0%, an IR transmittance (%IR) of no greater than 35%, a UV transmittance (%UV) of no greater than 40%, and a total solar transmittance (%TS) of no greater than 52%.

2. The glass of claim 1, wherein the glass has a redox value (FeO/Fe<sub>2</sub>O<sub>3</sub>) of at least 0.34, a visible transmittance (Lta) of at least 70%, an IR transmittance (%IR) of no greater than 30.

3. The glass of claim 2, wherein said dominant wavelength and excitation purity are measured at a nominal thickness of the glass of anywhere from 3 mm to 4 mm, and wherein the glass has a dominant wavelength of from 480 to 520 nm and an excitation purity (Pe) of no greater than 3.0%.

4. The glass of claim 1, wherein the glass is substantially free of nickel and chromium.

5. The glass of claim 1, wherein the glass has a redox value (FeO/Fe<sub>2</sub>O<sub>3</sub>) of at least 0.38.

6. The glass of claim 1, wherein the glass has a %TS of no greater than 50%.

7. The glass of claim 1, wherein said colorant portion consists essentially of:

|   |                   |
|---|-------------------|
| total iron (expressed as Fe <sub>2</sub> O <sub>3</sub> ) | 0.3 to 0.6 %      |
| cerium oxide  | 0.05 to 0.75 %    |
| selenium  | 0.00005 to 0.005% |
| cobalt oxide  | 0.0005 to 0.01%   |
| titanium oxide  | 0 to 0.75%.       |

8. The glass of claim 1, wherein the glass has a visible transmission Lta of at least about 70%.

9. The glass of claim 1, wherein said colorant portion consists essentially of:

|  |                   |
|--|-------------------|
| total iron (expressed as $\text{Fe}_2\text{O}_3$ ) | 0.35 to 0.55 %    |
| cerium oxide                                       | 0.10 to 0.60 %    |
| selenium   | 0.0001 to 0.0009% |
| cobalt oxide                                       | 0.001 to 0.004%   |
| titanium oxide                                     | 0.05 to 0.6%.     |

10. The glass of claim 1, wherein the glass has a %IR of no greater than 29%.

11. The glass of claim 1, wherein the glass has a %IR of no greater than 29% and a %TS of no greater than 49%.

12. The glass of claim 1, wherein the glass has a color characterized as follows when measured according to Ill. D65, 10 degree observer:

|    |                |
|----|----------------|
| a* | from -4 to +1  |
| b* | from -3 to +3  |
| L* | from 80 to 95. |

13. A grey glass comprising:

a base glass portion comprising:

| Ingredient                     | wt. %     |
|--------------------------------|-----------|
| SiO <sub>2</sub>               | 67 – 75 % |
| Na <sub>2</sub> O              | 10 – 20 % |
| CaO                            | 5 – 15 %  |
| MgO                            | 0 – 7 %   |
| Al <sub>2</sub> O <sub>3</sub> | 0 – 7 %   |
| K <sub>2</sub> O               | 0 – 7 %   |

and a colorant portion comprising:

|   |                  |
|---|------------------|
| total iron (expressed as Fe <sub>2</sub> O <sub>3</sub> ) | 0.25 to 0.70 %   |
| cerium oxide  | 0.01 to 1.0 %    |
| selenium  | 0.00001 to 0.05% |
| cobalt oxide  | 0.0001 to 0.05%  |
| titanium oxide  | 0 to 1.0%        |

wherein the grey glass has a redox value (FeO/Fe<sub>2</sub>O<sub>3</sub>) of at least 0.30, a visible transmittance (Lta) of at least 65%, a dominant wavelength in the range of from 435 nm to 570 nm, an excitation purity (Pe) of no greater than 5.0%, an IR transmittance (%IR) of no greater than 35%, a UV transmittance (%UV) of no greater than 40%, and a total solar transmittance (%TS) of no greater than 52%, and wherein the glass is substantially free of nickel.

14. The glass of claim 13, wherein the glass has a redox value (FeO/Fe<sub>2</sub>O<sub>3</sub>) of at least 0.34, a visible transmittance (Lta) of at least 70%, an IR transmittance (%IR) of no greater than 30%, and a UV transmittance (%UV) of no greater than 40%.

15. The glass of claim 14, wherein said dominant wavelength and excitation purity are measured at a nominal thickness of the glass of anywhere from 3 mm to 4 mm, and wherein the glass has a dominant wavelength of from 480 to 520 nm and an excitation purity (Pe) of no greater than 3.0%, and wherein the colorant portion comprises from 0 to 0.3% erbium oxide.

16. The glass of claim 13, wherein the glass is substantially free of chromium.

17. The glass of claim 13, wherein the glass has a redox value ( $\text{FeO}/\text{Fe}_2\text{O}_3$ ) of at least 0.38.

18. The glass of claim 13, wherein the glass has a %TS of no greater than 50%.

19. The glass of claim 13, wherein said colorant portion comprises:

|  |                   |
|--|-------------------|
| total iron (expressed as $\text{Fe}_2\text{O}_3$ ) | 0.3 to 0.6 %      |
| cerium oxide                                       | 0.05 to 0.75 %    |
| selenium   | 0.00005 to 0.005% |
| cobalt oxide                                       | 0.0005 to 0.01%   |
| titanium oxide                                     | 0 to 0.75%.       |

20. The glass of claim 13, wherein the glass has a visible transmission Lta of at least about 70%.

21. The glass of claim 13, wherein said colorant portion comprises:

|  |                   |
|--|-------------------|
| total iron (expressed as $\text{Fe}_2\text{O}_3$ ) | 0.35 to 0.55 %    |
| cerium oxide                                       | 0.10 to 0.60 %    |
| selenium   | 0.0001 to 0.0009% |
| cobalt oxide                                       | 0.001 to 0.004%   |
| titanium oxide                                     | 0.05 to 0.6%.     |

22. The glass of claim 13, wherein the glass has a %IR of no greater than 29%.

23. The glass of claim 13, wherein the glass has a %IR of no greater than 29% and a %TS of no greater than 49%.

24. The glass of claim 13, wherein the glass has a color characterized as follows when measured according to Ill. D65, 10 degree observer:

|    |                |
|----|----------------|
| a* | from -4 to +1  |
| b* | from -3 to +3  |
| L* | from 80 to 95. |

25. Glass comprising:

|  |                  |
|--|------------------|
| total iron (expressed as $\text{Fe}_2\text{O}_3$ ) | 0.25 to 0.70 %   |
| cerium oxide                                       | 0.01 to 1.0 %    |
| selenium   | 0.00001 to 0.05% |
| cobalt oxide                                       | 0.0001 to 0.05%  |
| titanium oxide                                     | 0 to 1.0%        |

wherein the glass has a redox value ( $\text{FeO}/\text{Fe}_2\text{O}_3$ ) of at least 0.30, a visible transmittance (Lta) of at least about 65%, a dominant wavelength in the range of from 435 nm to 570 nm, an IR transmittance (%IR) of no greater than 35%, and a UV transmittance (%UV) of no greater than 40%, and wherein the glass is substantially free of nickel.

26. The glass of claim 25, wherein the glass has a redox value ( $\text{FeO}/\text{Fe}_2\text{O}_3$ ) of at least 0.34, a visible transmittance of at least about 70%.

27. The glass of claim 25, wherein the glass is substantially free of chromium.

28. The glass of claim 25, wherein the glass has a redox value ( $\text{FeO}/\text{Fe}_2\text{O}_3$ ) of at least 0.38.

29. The glass of claim 25, wherein the glass has a total solar transmittance (%TS) of no greater than 50%.

30. The glass of claim 25, wherein a colorant portion of the glass consists essentially of:

|  |                   |
|--|-------------------|
| total iron (expressed as $\text{Fe}_2\text{O}_3$ ) | 0.3 to 0.6 %      |
| cerium oxide                                       | 0.05 to 0.75 %    |
| selenium   | 0.00005 to 0.005% |
| cobalt oxide                                       | 0.0005 to 0.01%   |
| titanium oxide                                     | 0 to 0.75%        |
| erbium oxide                                       | 0 to 0.3%.        |

31. (Original) The glass of claim 25, wherein the glass has a visible transmission  $T_{\text{vis}}$  of at least about 70%.

**(IX) EVIDENCE APPENDIX**

None

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(X) **RELATED PROCEEDINGS APPENDIX**

None